Main Processor

150

Interconnect

Client
manages interfaces

160

Pipe Bundle
to an interface

100

110 USB Driver (USBD)

Host Software (Optional)

Default Pipe
to Endpoint Zero

120 HC Driver (HCD)

USB System
manages pipes

HW-Defined

130 Host Controller

S I E

Root Hub

USB Wire

USB Bus Interface

140

Figure 1

Figure 2

310

Main
Processor

Memory

305

300

USB Host
System

Non-USB
Device
Interfaces

320

USB
Device

USB
Device
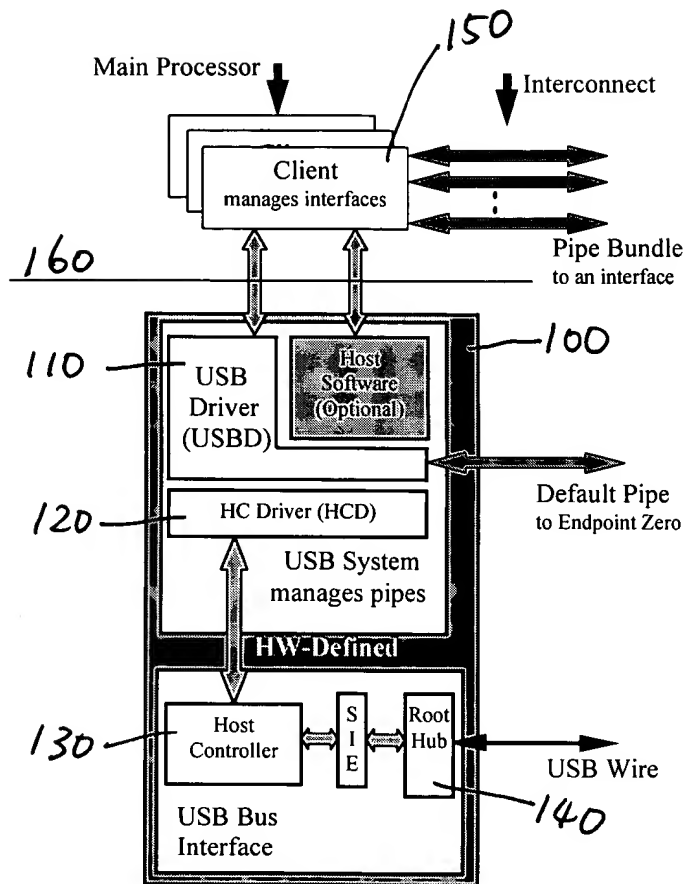
320

Non-USB
Device

320

USB
Device

USB
Device

320

Figure 3

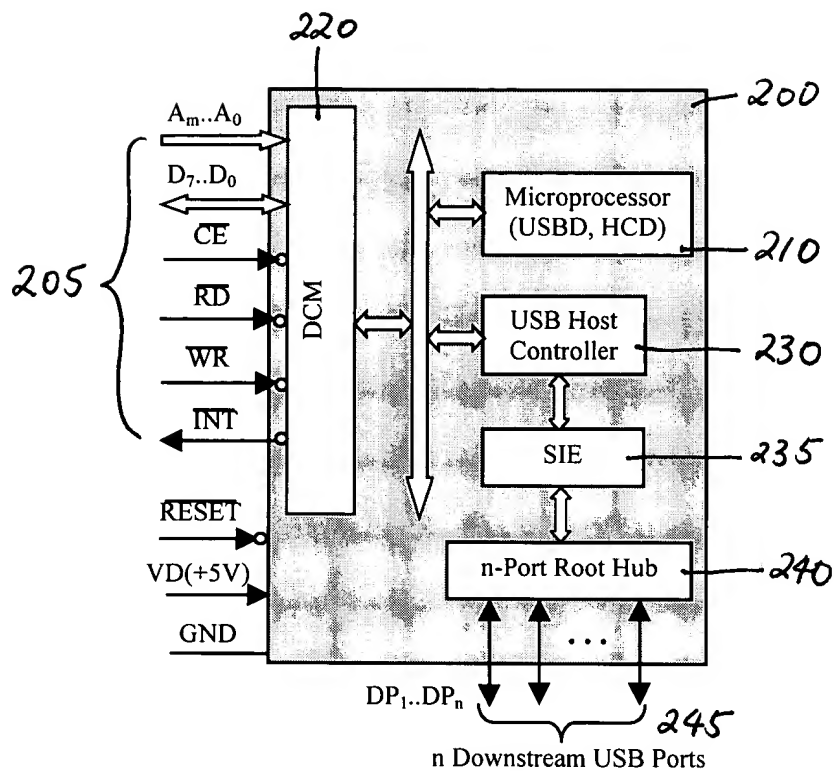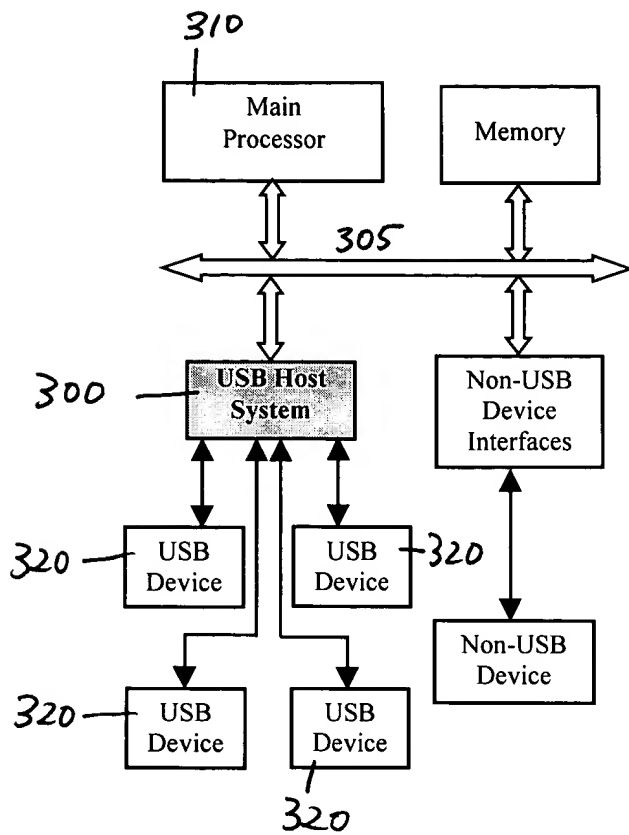|	
000H	Area used for CPR, DPR, and SCR. The Main Processor 310 has the flexibility in allocating buffer sizes and multiple Records to fit the need of different USB transfers. Main Processor 310: Read/Write USB Host System 200: Read/Write
Last Address-m	Reserved for EER USB Host System 200: Write only Main Processor 310: Read only
Last Address-3	MTUH: Main Processor 310 to USB host system 200 Message High Byte. Main Processor 310: Write only. USB host system 200: Read only
Last Address-2	UTMH: USB Host System 200 to Main Processor 300 Message High Byte. Main Processor 310: Read only. USB Host System 200: Write only
Last Address-1	UTML: USB Host System 200 to Main Processor 310 Message Low Byte. Main Processor: Read only. USB Host System 200: Write only Writing to UTML sends an interrupt to Main Processor 310
Last Address	MTUL: Main Processor 310 to USB host system 200 Message Low Byte. Main Processor 310: Write only. USB Host System 200: Read only Writing to MTUL sends an interrupt to USB Host System 200

400

410

420

430

435

425

Figure 4

Field	Size	Description
bmControl	1	Used by the Main Processor 310 to identify types of I/O request packet (IRP), and to control USB host system 200 activities. For Control Pipe Record: Bit 7 is 0, Bit 6 is 1, Bits 5...0 are Reserved.
bStatus	1	Used by the USB host system 200 to report the status of the IRP to the Main Processor 310.
wXferCount	2	For transfer from host to device: Used by the USB host system 200 to report to the Main Processor 310 the number of bytes successfully sent to the device. It must be less than wLength. For transfer from device to host: Used by the USB host system 200 to report to the Main Processor 310 the number of bytes of data received and put in the Data area. It must be less than wLength.
bDeviceAddress	1	USB Device address, bit 7 always zero
bEndpointNumber	1	Endpoint number, default is endpoint 0. Bits 7-5 always zero

bRequestType	1	Type of command for the USB device.
		Bit 7: Data transfer direction
		    0 = Host-to-device, 1 = Device-to-host
		Bits 6...5: Type
		    0 = Standard request (Defined in Chapter 9 of USB Specification)
		    1 = Class request (Defined in USB Device Class Specification)
		    2 = Vendor request (Also called Client Request, used by the Client Software to control a USB device. Defined by a developer writing the device driver)
		    3 = Reserved
		Bits 4...0: Recipient
		    0 = A downstream Device, 1 = An Interface in a device
		    2 = An Endpoint in a device, 3 = Other, 4...31 = Reserved
		All the standard requests are handled by the USB host system 200. In normal operation, the user only needs to use the class and vendor requests. Thus, in normal operation, bits 6...5 of bRequestType should be 01 or 10.

bRequest	1	This field specifies the particular command for the USB device. Defined by USB specification if bits 6...5=00 in bmRequestType (Chapter 9 of USB Specification). Defined by USB device driver if bits 6...5=10 in bmRequestType
wValue	2	The contents of this field vary according to the request. It is used to pass a parameter to the device, specific to the request. Defined by USB device driver if it is a client request.
wIndex	2	The contents of this field vary according to the request. It is used to pass a parameter to the device, specific to the request. Defined by USB device driver if it is a client request.
wLength	2	For transfer from host to device: Number of bytes of data to transfer For transfer from device to host: Size of data buffer in bytes If this field is zero, there is no data phase for the control transfer.
Data	vary	For transfer from host to device: Actual data if data is to be sent to device via the control pipe. Number of bytes of data specified wLength. For transfer from device to host: Buffer area

Figure 5

Field	Size	Description
bmControl	1	Used by the Main Processor 310 to identify types of IRP, and to control USB host system 200 activities. For Data Pipe Record: Bit 7: 0 Bit 6: 0 Bits 5...0: Reserved.
bStatus	1	Used by the USB host system 200 to report the status of the IRP to the Main Processor 310.
wXferCount	2	For transfer from host to device: Used by the USB host system 200 to report to the Main Processor 310 the number of bytes successfully sent to the device. It must be less than wLength. For transfer from device to host: Used by the USB host system 200 to report to the Main Processor 310 the number of bytes of data received and put in the Data area. It must be less than wLength.
bDeviceAddress	1	USB Device address, bit 7 always zero
bEndpointNumber	1	Endpoint number, default is endpoint 0. Bits 7-5 always zero
wLength	2	For transfer from host to device: Number of bytes of data to transfer For transfer from device to host: Size of data buffer in bytes
Data	vary	For transfer from host to device: Actual data if data is to be sent to device via the control pipe. Number of bytes of data specified wLength. For transfer from device to host: Buffer area

Figure 6

Command Name	Description
USB System Reset	Resets USB host system 200 and all downstream hubs and devices. All Records will be lost and all devices will be re-enumerated.
Global Suspend	Suspend all hubs and devices including the root hub. However, the USB host system 200 will not be suspended. The USB host system 200 does not support remote wakeup. After a System Suspend, the system can only be waken up by the Main Processor issuing a System Resume to the USB host system 200.
Global Resume	Resumes all hubs and devices in the system.
Device Reset	Sending a USB Reset signal to the designated device.
Device Suspend	Suspend a designated device.
Device Resume	Resume a designated device.
Pipe Reset	The pipe's IRPs are aborted. The host state is moved to Active. If the reflected endpoint state needs to be changed, that must be commanded explicitly by the USBD client.
Pipe Halt	The pipe's state is set to Halted.
Clear Pipe Halt	The pipe's state is cleared from Halted to Active.
Pipe Abort	All of the IRPs scheduled for a pipe are retired immediately and returned to the client with a status indicating they have been aborted. Neither the host state nor the reflected endpoint state of the pipe is affected.

Figure 7

Field	Size	Description

bmControl	1	Used by the Main Processor 310 to identify types of IRP, and to control USB host system 200 activities. For System Command Record:
		Bit 7: 1
		Bits 6...5: Reserved
		Bits 4...3: Command Category
		      00: Command applies to USB system
		      01: Command applies to a Device
		      10: Command applies to an Endpoint
		      11: Reserved
		Bit 2: Reserved
		Bits 1...0: Command Name
		      For USB system and Device (Bits 4...3=00 or 01)
		         00: System or Device Reset
		         01: System or Device Suspend
		         10: System or Device Resume
		         11: Reserved
		      For Endpoint (Bits 4...3=10)
		         00: Pipe Reset
		         01: Pipe Halt
		         10: Clear Pipe Halt
		         11: Pipe Abort

bStatus	1	Used by the USB host system 200 to report the status of the SCR to the Main Processor.
bDeviceAddress	1	USB Device address, bit 7 always zero. Not used if Bits 4...3 of bmControl=00.
bEndpointNumber	1	Endpoint number. Bits 7-5 always zero. Not used if Bits 4...3 of bmControl=00 or 01.

Figure 8

900

Field	Size	Description
bStatus	1	Used by the USB host system 200 to report the status of the device and systems errors to the Main Processor. Bit 7=0: Device enumeration report. Bit 7=1: System error report. The Record consists of only four bytes. Bits 6...0: Pending, being tested.
bDeviceAddress	1	When bStatus_Bit_7=0, this field is the address assigned to the USB Device by the USB host system 200, bit 7 always zero. When bStatus_Bit_7=1, this field is an auxiliary system error code.
idVendor	2	When bStatus_Bit_7=0, this field is the Vendor ID (assigned by the USB). When bStatus_Bit_7=1, this field is reserved.
idProduct	2	Product ID. Not present when bStatus_Bit_7=1
bcdDevice	2	Device release number in BCD. Not present when bStatus_Bit_7=1.
bConfiguration	1	The current configuration number of the device. Upon enumeration, the device is configured to its first configuration specified by the device descriptors. Not present when bStatus_Bit_7=1.
Reserved	3	Not present when bStatus_Bit_7=1.

Figure 9